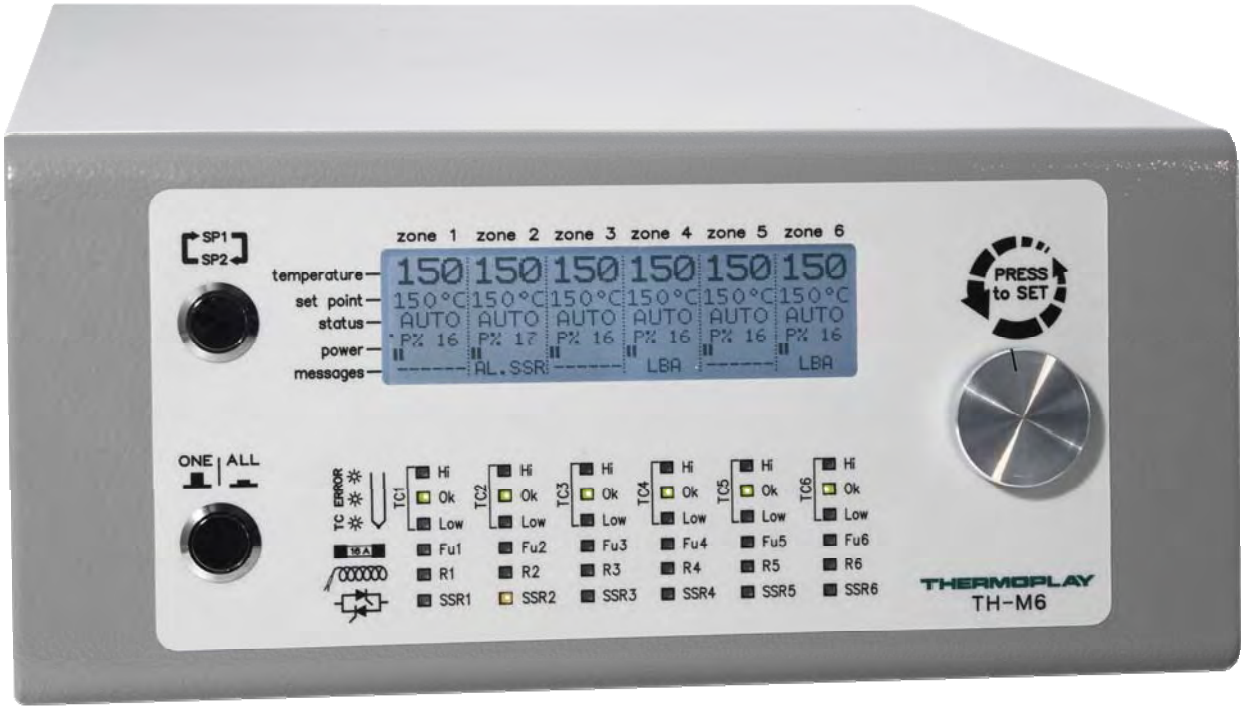
TH-M6

6-12 zone Hot Runner Controller

User manual



THERMOPLAY® HotRunnerSystems

Rev. 1.2

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rev.	Date	SW. ver.	New Features
1.0	Sept. 09	A1.6 A1.5	First issue
1.1	Oct. 09	A1.8 A1.7	Added status “CHECK” (paragraph 5.7)
1.2	Nov. 09	A2.0 A2.0	2s pressure to modify zone status Counter of worked days Heater failure detection even with P=100% Indicazione anomalia resistenza con P=100% Hysteresis on “wait” for synchronous heating Function of parameters copy from board to board

1 Components identification

THM6 control unit is normally supplied in the following configuration:

- main unit
- mould connection cables, input output cable (optional), interconnecting cable
- electrical scheme
- User and maintenance manual
- QC and conformity certificate

2 Installing specifications

The equipment was designed and built for the regulation of “hot runner systems” through the control of electrical energy supplied to the heating elements of the various parts of the system (distributors, nozzles, ….) with the aim of keeping process temperatures stable (max temperature 400°C).
The apparatus allows independent control of each zone.
The control and power connectors (TC) are positioned on the rear panel of the equipment.
The nominal value for the current through each zone is 16A.

This is a quite complex apparatus hence its life and reliability are guaranteed only if it is correctly used and maintained.

Carefully read the advice supplied in this manual because it contains important information regarding the safety of installation, use and maintenance.

Check the integrity of the apparatus once the packaging is removed. In case of doubt do not use it and refer to the supplier.

Before connecting the apparatus, check that the specifications of the plate correspond to those of the electricity supply (the plate is situated at the back of the machine).

This apparatus must be employed solely for the use for which it was specifically designed, i.e. for the regulation and control of a “hot runner” system of which it is an integral part. Any other use is to be considered improper and therefore dangerous.

The manufacturer cannot be considered responsible for any damages sustained resulting from improper, erroneous and/or unreasonable use.

The electrical safety of this apparatus is assured only when connected to an effective ground (as set out by current regulations). The manufacturer denies responsibility for any damages to persons or objects resulting from the lack or inadequacy of the ground of this apparatus.

Ensure that the capacity of the power socket is compatible with the maximum power of the apparatus (indicated on the plate) and that the local electrical installation satisfies regulations and in particular: CEI 44-5 (EN 60204-1) art. 7.2.1-7.2.6. and CEI 64-8 art. 473.3.2.1 and art. 7.

2.1 Special warnings

- Ensure that moving parts cannot damage the controller or its connection cables.
- Since the controller is a highly ventilated piece of equipment, it needs to be positioned such that free circulation of airflow is enabled, therefore leave ample air spaces to allow the free flow of air.
- Before starting the system, pay special attention to how the supply to the controller is wired and how it is connected to the mould. Incorrect wiring of main supply phases into the controller can seriously damage electronic components. Crossing heater supply looms with thermocouples looms will produce damage to thermocouples looms or to the thermocouples (inside the mould) themselves.

The manufacturer cannot be considered responsible for damage caused to the controller and to the mould by customer wiring and connection errors.

2.2 Isolating the Controller

When the main switch (miniature circuit breaker) is in the OFF position, components inside the cabinets are all isolated from power supply by means of a mechanical switch.

Do not open the cabinet without first disconnecting the main supply cable from the power line. Remember that even with main switches in OFF positions, there are unguarded terminals inside the cabinet witch may have dangerous potential across them.

2.3 Isolating by means of SSR: how does it work

Remember that solid state relays cannot make a mechanical break of the contacts since they are semi-conductor devices.

Hence, even if all the regulators are disabled (or in “Manual” mode with output power set to “0”) only the current on loads will be 0, there may still be some voltage in the heaters.

On the three-phases with neutral supply system, SSR units are always positioned on the live side of the supply, this keep the residual voltage to a low value. On the three-phases delta without neutral system supply there always be phase voltage on the heaters when main switch is in ON position.

Furthermore the SSR may fail in conducting condition. In this case temperature will arise even if theoretical power is set OFF.

2.4 Specifics and technical characteristics

Table1: technical characteristics

Supply Voltage	400 [V] 3 phases with neutral, 240 [V] 3 phases without neutral
Voltage bandwidth	Stable within 10% supply voltage swing
SSR	16 A on each zone. Normal working: zero crossing. Drying: phase angle fired modulation.
Overload protections	High speed fuse links
Protection for thermocouple reading circuits	The 6 TC input on each board are insulated together (insulating voltage 250V) and towards the supply (insulation double reinforced).
Sampling time on each channel	130 [ms]
Sensor type	Thermocouples type J,K e Pt100
Control range	According to thermocouples range of measuring
Heater / thermocouples connectors	Harting Han E
Control algorithm	• Closed loop (PID), open loop (manual), slave function. • Synchronous heating of all the zones
Reading scale	Celsius, Farenheit.
Main overload protection	Miniature circuit breaker
Operative temperature	0 – 50 [°C]
Human interface	• One graphic display 240x64 points for each 6 loops board • 6 led dedicated to the diagnostic for each loop • Well with encoder “turn & press” • Button for collective modifications • Button for the SP1-SP2 switch
Alarms and messages	• Over temperature • Band around SP (High, Low, Ok) • Thermocouple failure • Inverted thermocouple • Heater failure • Fuse failure • SSR failure • Supply line missing • Loop break alarm • Plastic leakage

3 Hardware characteristics

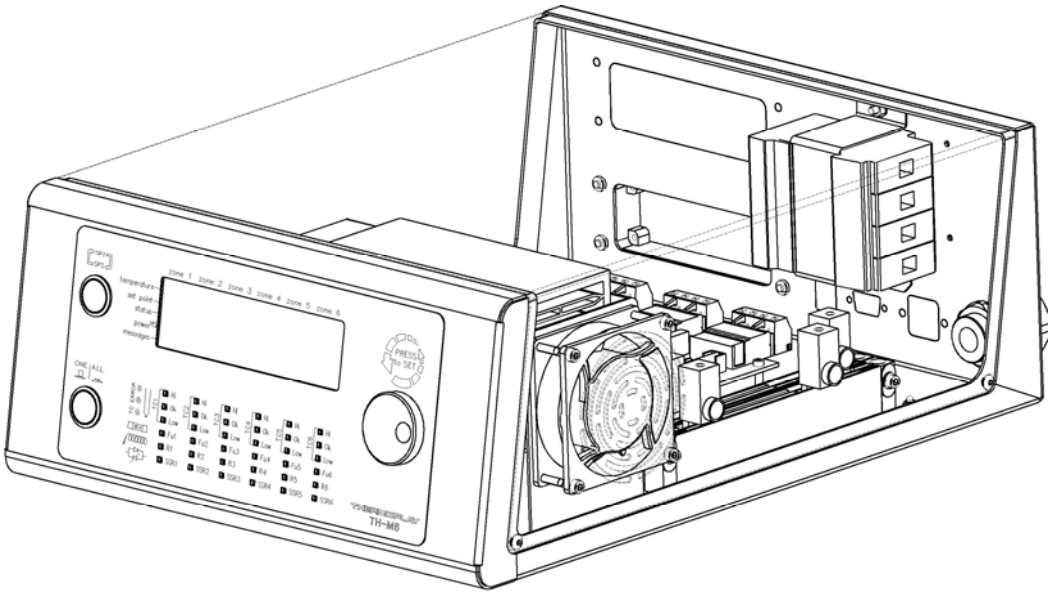


Figure 1

The structure of the temperature controller is visible in figure 1. In function of the number of zones one or two circuit boards are present connected to the relative led boards in order to signal alarms and anomalies complete with graphic displays to visualize the values found or set.

On the front panel two circular buttons are present to permit the selection of the active set point (SP1 - SP2) and the collective modification and a turn and press wheel to modify all the parameters.

3.1 Display

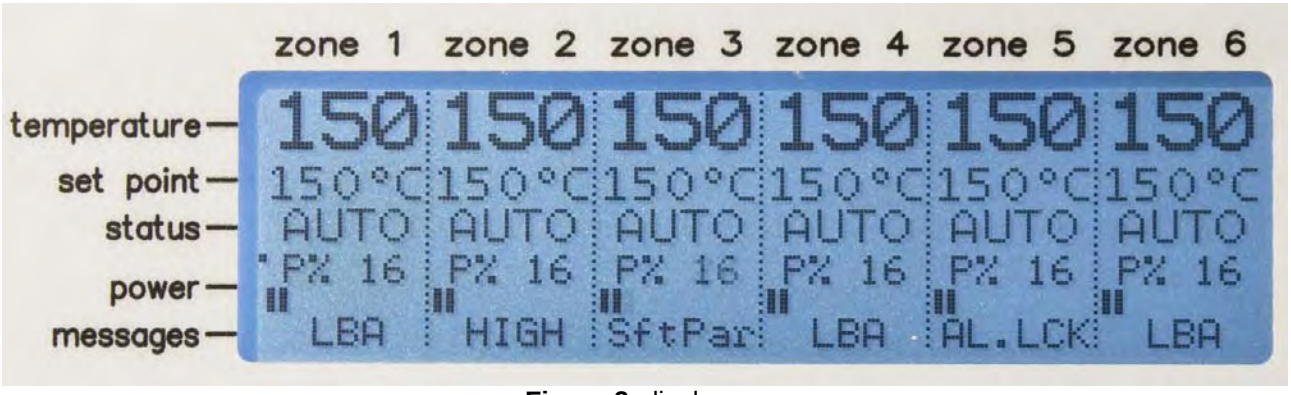


Figure 2: display

On the display for each zone:

- **temperature**: temperature found by the relative thermocouples
- **set point**: “ideal” temperature
- **status**: functioning mode (AUTO, MAN, SLAVE)
- **power**: the power distributed, expressed in percentile of the nominal value
- **messages**: the zone reserved for alarms and sliding messages

3.2 Led indicators

Figure 3: led indicators

On the front panel, a series of led indicators permit the immediate diagnosis of each zone:

- **High**: the difference between the actual temperature and the set point is higher than the tolerances (parameter “BarGraph Delta +”)
- **Ok**: the temperature is within the tolerances
- **Low**: the difference between the set point and the actual temperature is greater than the tolerance (parameter “BarGraph Delta -”)
- The 3 led **High**, **Ok**, **Low** lit contemporaneously indicate an anomaly regarding the thermocouples (interrupted or inverted)
- : interrupted fuses
- : interrupted heater
- : anomaly solid state relays

See the paragraph relative to alarms for the actions to under take in case such anomalies occur.

4 Working details

The apparatus is designed to regulate in the best manner the power supplied in each zone so that the temperature reaches and maintains in time the value set in the active Set point.

When turning on the temperature controller it is possible to choose to activate the drying phase and auto-tuning. Terminated the drying phase on every zone a ramp is activated increasing the temperature while limiting the maximum power supplied (**soft start**). At the end of the soft start every zone continues heating without any limits regarding the power supplied. When each zone reaches a temperature equal to 75% of the active set point, the auto-tuning procedure begins. Only when the zones terminate this last phase, normal regulation begins, until reaching and maintaining the active set point.

4.1 Drying

After a long period of no usage the heaters in the injection system could have absorbed moisture. The insulating material of the heaters is highly hygroscopic and loses its properties. The drying function permits the supply to all the elements and for a certain duration of reduced voltage, this permits for the elimination of the humidity present without forming dangerous electrical discharges to ground

Phase angle modulation causes major problems of electromagnetic compatibility. Whereby we absolutely advise to protect the line with a power filter before the controller connection.

6 zones controller: filter Schaffner p/n FN3280H-36-33 or equivalent.

12 zones controller: filter Schaffner p/n FN3280H-64-34 or equivalent

Note: enable the drying function only if indispensable

4.2 Auto-tuning

In closed loop (mode AUTO) the power supplied on each heating element is calculated by the controller according to the thermocouple feedback. During the auto-tune phase the controller performs a self calibration of its regulating parameters. This allows a perfect behaviour, without overshoot in the rising phase and avoiding fluctuations during the steady state.

We advise you to turn on the auto tuning function at every mould change or at the first installation.

At every successive start, heating begins with the same parameters active during the last stop. The parameters calculated automatically during the tuning phase are: “Pb”, “Int”, “Der”, “Fuzzy control” (see paragraph 7).

If the Auto tune function is enabled, after the Soft Start, the heating goes on until 75% of the active set point (default value of the common parameter “Auto Tune Limit” = 25%). Independently, each zone starts the tuning procedure (now the status is “TUNE”).

It is normal that the duration of auto-tuning phase is different on each zone (longer in the zones with bigger thermal inertia).

Only when all the zones have finished the procedure (status of all the zones is back to “AUTO”) normal heating restarts until the set point is reached.

AUTO-TUNING IS ACTIVE ONLY ON SET POINT 1.

4.3 Soft start

During the soft start phase the power output is limited by a maximum value of 15% (default value of parameter “Soft Start %”) In the messages area appear “SftSrt”. In case of brief interruption, soft start is automatically deactivated: it is sufficient that the temperature of one zone is superior to the level of inhibition set (common parameter “Hot SS abort thr”, default value 80°C).

4.4 Synchronous heating

A delayed start-up of the nozzles (and in general of low thermal inertia) in respect to the manifold zones (high thermal inertia) is no longer necessary: all the zones follow the same incremental temperature ramp. In this way, the set point is reached contemporaneously (the tolerance is given by the common parameter “Wait threshold”) in all the elements of the injection system avoiding problems such as material degradation for excessive time at elevated temperature.

4.5 Functioning in automatic (closed loop)

In “**automatic**” the power supplied on the load is automatically set by the temperature controller. The operator can modify the value of the set point, not the percentage power supplied.

If the temperature controller finds an anomaly on the thermocouple, the power supplied goes immediately to 0% (parameter “Safety power.”).

4.6 Functioning in manual

In “**manual**” mode the temperature controller supplies the load with the power value set by the operator. The set point is no longer active. The temperature controller could work in this mode even in the case that a thermocouple breaks.

4.7 Stato “CHECK”

At the starting of the controller, all the zones with one of the anomalies listed below:

- heater failure
- thermocouple failure
- heater and thermocouple not connected (in used zone)

are automatically disabled.

The status of these zones is “CHECK”, the output power is 0%. These zones are not considered by digital output functions. (see paragraph 10.3). Contrarily to the “OFF” status, all the anomalies are visualised on the display and on the led panel.

It’s possible to manually modify the “CHECK” status to “MAN”, “SLAVE” or “OFF.

Only if the anomaly is removed it is possible to change the status to “AUTO” manually or by mean of restarting the controller.

4.8 Slave

Is a valid alternative to manual functioning in case the thermocouple fails. It is possible to submit a zone to another having the same thermal characteristics. The same power will be supplied and updated in time to the two heaters

4.9 Leakage of plastic Alarm

In case plastic material leaks the power absorption of the heater increases substantially. The temperature controller finds this increment in the power necessary to maintain a certain temperature “set point” and signals the anomaly allowing for a rapid intervention.

“Normal” absorption is memorised for each zone when the operator responds positively to the question “**Are the moulded pieces OK?**”**.** Reset of the values memorized happens at each modification of the set point and every time the auto-tuning function is activated.

LEAKAGE ALARM IS ACTIVE ONLY ON SET POINT 1.

5 System start-up

Positioning the miniature circuit breaker placed on the rear to “ON” the temperature controller turns on.

5.1 Enabling drying and auto-tuning

When turning on the temperature controller the operator must chose to start the drying of the heaters.

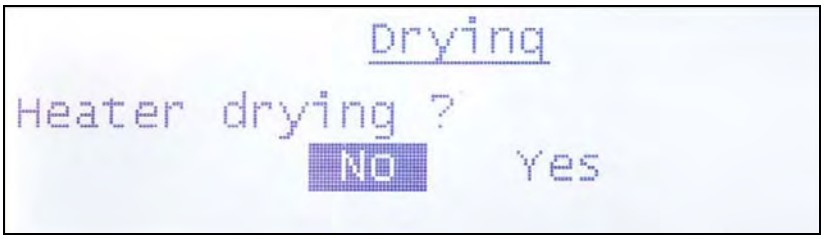


Figure 4: activating the drying function

Activate this function only after a long period of in use of the mould connected (see paragraph 5.1)

Analogously, the auto-tuning procedure must be activated (see paragraph 5.2)

Figure 5: activating the auto tuning phase

5.2 Language selection, regulating the contrast and brightness of the display

Keeping the wheel pressed down for more than 4 seconds access is gained to the language and the regulation display.

Note: it is possible to access this menu only when no zones have been selected. Contrarily, waiting a few seconds will allow the cursor to disappear automatically.

Figure 6: regulating the display

Pressing the wheel, passage to the next line is possible, turning the small wheel the value set becomes modified. Keep the small wheel pressed for 3 seconds to exit. The languages available are; English French and German.

5.3 Status modification, set point and power supplied

Position yourself on one zone by rotating the wheel and then press. The set point of that zone will appear in white characters on a black background.

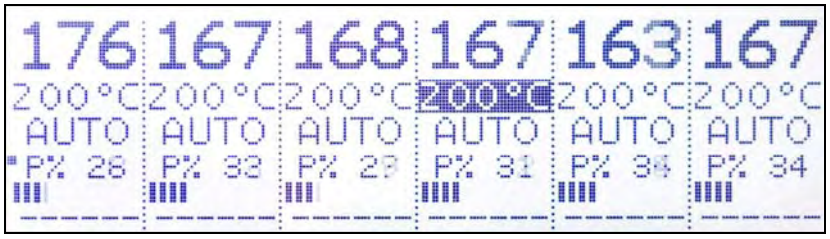


Figure 7: zone 4 selected

Rotating the wheel clockwise or anti-clockwise it is possible to increase or decrease the active set point. Pressing the wheel again exit from the zone will occur. Keep the weel pressed for more than 2s to modify the status of the zone.

Figure 8: modifying the status of the zone 4

AUTO: automatic mode
MAN: manual mode
SLAVE: the zone is “enslaved” to one other
CHECK: the zone was in “AUTO” mode at the controller start, but heater or thermocouple or both are damaged.

In the case of the “MANUAL” zone, the power % supplied will be modified.

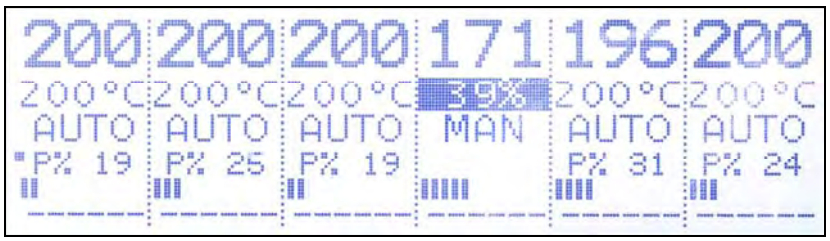


Figure 8: Modification of the power percentile of zone 4

In the case of the “SLAVE” mode the number of the master zone will be modified.

Figure 9: zone 4 submits to zone 3

Pressing the wheel again exit from the zone will occur. The set point flashes. To modify the parameters relative to another zone turn the wheel and repeat the sequence.

Pressing the switch “One All” all the set point colours become inverted and the modifications are extended to all the zones of the temperature controller.

Figure 10: selection of all the zones using the switch “One All”

5.4 Configuration mode

Using the wheel to position yourself on the zone you want to visualize or modify the functioning parameters.

. Press the wheel for more than 4 seconds.

Figure 11: configuration of zone 4

The password to access the parameters of zone “10” (tied to the functioning of the single zone).

The password to access the common parameters is “20” (tied to the functioning of the temperature controller on the whole).

In paragraph 7 a list of all the parameters and the relative meanings can be found.

With the wheel choose the parameter from the list, then press:

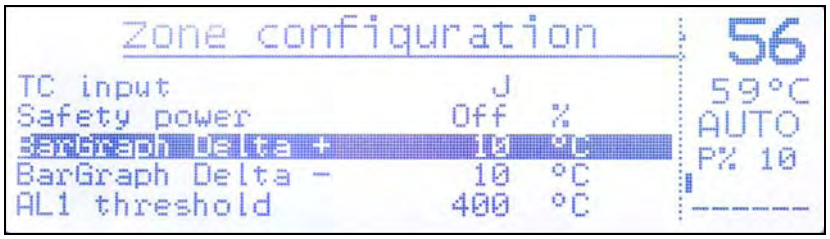


Figure 12: List of configuration parameters

Figure 13: modify a parameter

To modify, rotate clockwise or anti-clockwise. Press to confirm.

Pressing the "One All" button after selecting a parameter, the value assigned will be seen in all the zones of the temperature controller and the eventual modifications will be executed in each.

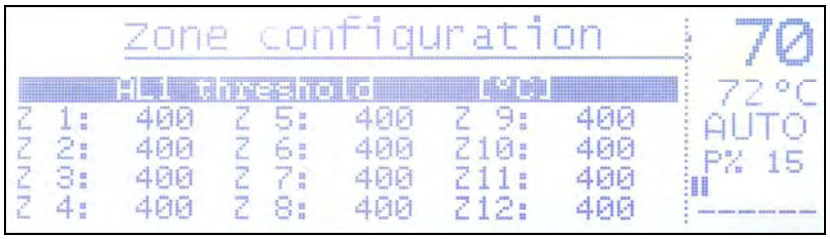


Figure 14: visualizing and modifying a parameter in all the zones

Choose "Exit" to exit and return to the working visualisation.

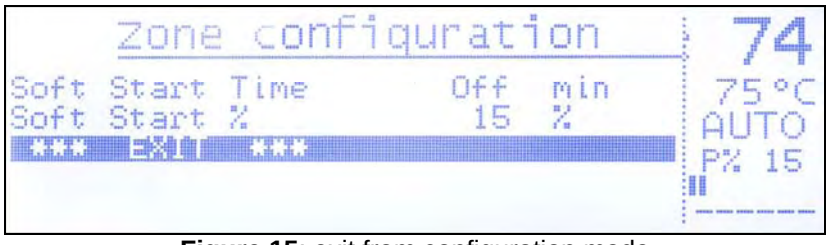


Figure 15: exit from configuration mode

5.5 Aligning a parameter on all the zones

The procedure to align all the values of a parameter (set point, power percentage supplied, status) or configuration to one same value is very simple. The figures bellow demonstrate how to align all the SP1 values to 200°C:

Figure 16: initial situation, all the set point have different values

Position the cursor on any zone, press the wheel 1 time only. Keep the "**One All**" button pressed and turn the small wheel anti-clockwise until all the set points are aligned to the minimum value possible (parameter "SP min, 50°C is the default value) Let go of the "**One All**" button.

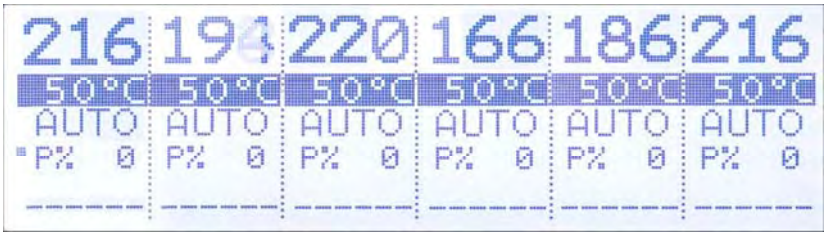


Figure 17: alignment of the minimum value possible

Press the "**One All**" button once again and turn the small wheel setting the value desired.

Figure 18: alignment of the value required

6 Default values of the control parameter

In the tables 2 and 3 zone and common parameters can be found.

Table 2: zone parameters (password = “10”)

Parametro	Default	Unit	Min.	Max.
Thermocouple type	J	-	J, K, Pt100	
Safety power	OFF		OFF	ON
BarGraph delta +	10	°C	0	999
BarGraph delta -	10	°C	0	999
AL1 threshold	400	°C	0	999
Hysteresis AL1	5	°C	0	999
Enable Alr off	OFF		OFF	ON
Autotune	OFF	-		
Pb (proportional band)	(TUNE)*	°C	0	199.9
Int (integral time)	(TUNE)*	s	0	999
Der (derivative time)	(TUNE)*	s	0	999
Integral pre-load	(TUNE)*	%	0	100
Fuzzy control	(TUNE)*	-	0.1	10
SP1	140	°C	0	SP max
SP2	70	°C	0	SP max.
SP min	50	°C	0	SP max
SP max	400	°C	SP min	999
Ramp up (GR+)	20	°C/min	0	99.9 100=max
Ramp dn (GR-)	100	°C/min	0	99.9 100=max
Soft start time	5	min	0	200
Soft start %	15	%	0	100

*** parameters automatically calculated during the TUNE phase**

Table 3: common parameters (password = “20”)

Parameter		Default	Unit	Min.	Max.
Cycle Time	Output cycle time	2.0	s	0.5	10.0
Auto Tune Limit	Threshold % auto-tune start	25	%	0	100
Wait threshold	Synchronous tolerance	10	°C	0=OFF	100
Wt. Threshold hys	Hysteresis on “Wait threshold”	2.0	°C	0.0	10.0
Drying time	Drying time duration	900	s	0	999
Drying Voltage	Drying voltage	130	V	0	160
Hot SS abort thr	Threshold value abort soft start	80	°C	0	999
TOK out level	Logical level output 1 (T.OK) 1: close=OK	1	-	0	1
FAIL out level	Logical level output 2 1: close=fail	1	-	0	1
WAIT out enable	“WAIT” output enabled	0	-	0=OFF	1=ON
Output delay time	Delay for output 1 and 2	5	s	0	999
SP2 ing.dig. lvl	Logical level input 1 SP2 1: closed =SP2	1	-	0	1
OFF ing.dig. lvl	Logical level input 2 OFF 1: closed= OFF	1	-	0	1
End tune hld bnd	Hold band for waiting after end of auto-tune	15	°C	0	100
Lkg validate bnd	Leakage validate band of temperature, around set point	5	°C	0	999.9
Lkg validate time	Delay to calculate steady state average power after set point is reached	900	s	30	7200
Lkg average time	Time for average value calculation	300	s	30	7200
Lkg average limit	Relative power % increasing to get the leakage alarm	50	%	0	100
Working days	Total worked days board 1	0	days	read only	
Working days sk.2	Total worked days board 2	0	days	read only	

7 Alarms and troubleshooting

Table 4

Problem	"messages" area	Scrolling message	What to do
Fuse	AL. FU	Fuse failure: check FU_	See paragraph 9.1: Fuse substitution
Thermocouple	AL. TC	Thermocouple failure: check TC_ Reversed thermocouple: check TC_	The thermocouple could be interrupted or inverted. Check the connections between Temperature controller and mould.
Solid state relays	AL. SSR	Disconnect immediately heater R_ - switch off the zone - contact customer service	Is a serious alarm. Shut the temperature controller off and disconnect the heater connected to the zone in which the anomaly was found. The other zones could continue working. Contact Thermoplay's customer service.
Heater	AL. R	Heater failure: check R_	The heater is interrupted or disconnected. Check the connection between the temperature controller and the mould.
Power supply	-	Supplly phase L1/L2/L3 missing	The temperature controller finds a missing phase of power. It is usually necessary to intervene on the power supply.
Loop Break Alarm	LBA	Zone_ alarm: check TC_ - contact customer service	The temperature found does not reach the set point. It could be due to an error in the correspondence between the heater and the thermocouple or due to a contact between the thermocouples two conductors in an intermediate point between the hot joint and the cold joint. ("pinched thermocouple")
Plastic leakage	AL. LCK	Leakage in zone_: irregular absorption	The temperature controller finds an anomalous absorption. Check that there is no leakage of plastic material.
Controller overheating	-	Over-temperature: check the aperture for the fans	The internal temperature of the temperature controller is too high. Check that the forced ventilating apertures are free.
Cooling fan	-	Cooling fan not working - contact customer service	The fan mounted on the heat sink is blocked. Contact Thermoplay's customer service

8 Maintenance

This apparatus has been projected so that it requires a minimum amount of maintenance possible.

The only components that could be considering normal usage require substitutions are the fuses.

Periodical maintenance is limited to the cleaning and the opening of the cooling vents.

Check the insulation of all the wires of the connections of the mould and that the power source is in good conditions.

Insulate the temperature controller disconnecting the main wire before starting any maintenance

8.1 Fuse substitution

The substitution of the “protective” fuse is an operation that can be done by the temperature controller operator.

Before opening the temperature controller it is necessary to unplug the power cable. This must be done only by qualified personnel.

The interruption of a fuse is due to an anomalous absorption. It is necessary to find the cause before turning on the temperature controller.

Remove the 4 screws that fixes the lid and remove the lid itself. In the case of a temperature controller of 6 zones there is one power board and the fuses are visible – numbered “Fu1 – Fu6”. Remove the burnt fuse with the help of a screwdriver , as illustrated in Figure 20. Substitute the fuse with one having the same characteristics (extra rapid fuse Ø6,3 L=32, FF16a).

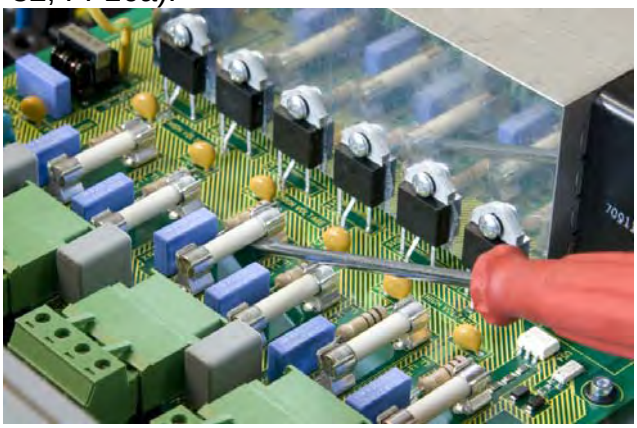


Figure 19: substituting a fuse

In the case of a 12 zone temperature controller, 2 power boards are present. The lower power board is relative to the zones 1-6 and the superior board is relative to zones 7-12. The fuse with initials “Fu2” on the superior power board corresponds to zone 8 on the front panel of the temperature controller.

To access the inferior board, unscrew the 2 screws and turn the board over (Figure 21). It is not necessary to disconnect the connectors.

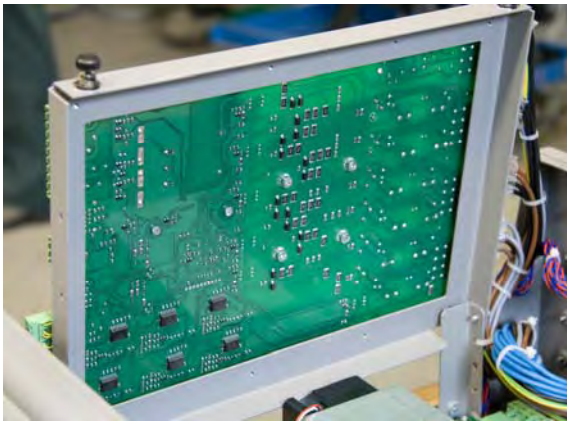


Figure 20: tilt the upper board to get access to the lower one

9 Optional accessories

9.1 Interconnection of two temperature controllers

On request, if it is expected to use two temperature controllers with the same injection system, an interconnection cable is supplied which will allow the extension of the synchronous increment function. The connected zones will follow the same incremental temperature ramp. The interconnection cable must be connected to two connectors YE (4 poles male).

Note: set the parameter “WAIT out enable” = 1 to enable the function.

9.2 Remote connection between serial port RS-485

Thermoplay uses the ModBUS® communication protocol - RTU variant because it is one of the most widespread and best known in the field of industrial communications. It is a protocol free from royalty. The (YC) connectors for serial connection of the temperature controller is supplied on request (optional).
The document relative to the communication protocol for temperature controllers TH-M6 is available on request.

9.3 Digital input - output

A (YD) connector is available on request including the relative wire for the connection of the temperature controller to the injection machine and other auxiliary apparatus.

The digital inputs (from the exterior to the temperature controller) are:

- **DIN-1**: automatic commutation on SP2, scrolling message “SP2 chosen with external INPUT” The parameter for the commutation no-nc is “SP2ing.dig.lvl”.
- **DIN-2**: automatic commutation of all the zones in OFF, scrolling message “OFF chosen with external INPUT”. The parameter for the commutation no-nc is “OFF ing.dig.lvl”.

The digital outputs (from the temperature controller to the exterior) are:

- **OUT-1**: all the temperatures are in tolerance. The parameter for the commutation no-nc is “TOK out level”. The zones in “OFF”, “MAN”, “SLAVE” or “CHECK” mode are not considered.
- **OUT-2**: emergency due to a high temperature or to a serious problem: missing phase, damaged SSR, interrupted heater, fuse and TC failure. Fuse and thermocouple are masked at the start-up: will be signalled only if not present in the initial phase. The parameter for the commutation no-nc is “FAIL out level”.

10 Warranty

The warranty covers only the failure due to manufacturing defects. The warranty for the power boards has a duration of 365 worked days (parameter “Working days” and “Working days sk.2”) in common parameters area). All the other components are covered for a duration of 2 years from the delivery date.

11 Disposal of A.E.E.

Information for users

In accordance with the article 13 of the legislative decree of July 25,2005, n.151 “The Directive 2002/95/CE, 2002/96/CE and 2003/108/CE, in regard to the reduction of the use of dangerous substances present in electric and electronic equipment, as well as waste disposed”

The symbol of the garbage bin above indicated on the equipment or on its box indicated that at the end of the life of the product it must be gathered separately form other waste.

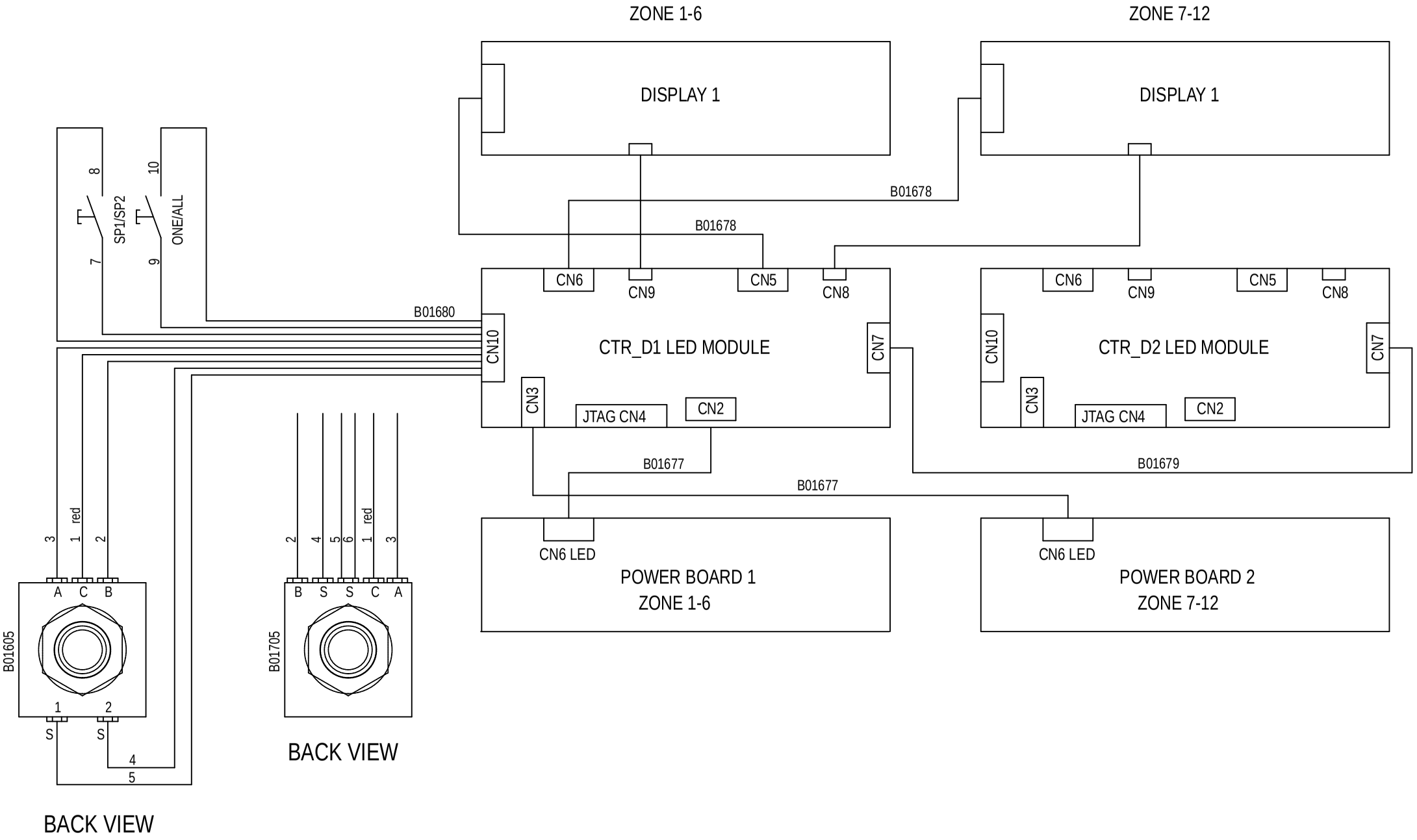
The differentiated waste disposal of such equipment must be organized and managed by the producer. The user who would like to get rid of such waste must contact the producer and follow the system that the producer ha adopted to allow for the differentiated gathering of the product no longer utilisable.

The adequate gathering for the successive start of the equipment sent to be recycled, treated and to be disposed o fin an environmentally compatible manner, contributed to avoid possible regulative effects on the environment, on health and favours the re-utilisation of the material of which the equipment is made.

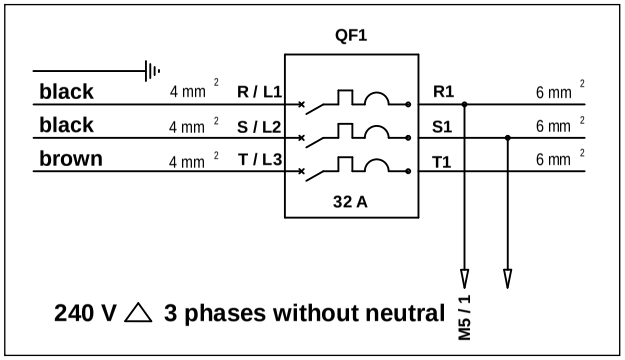
The abusive disposal of the product by the user will cause the application of the administrative sanctions foresee by the current norms.

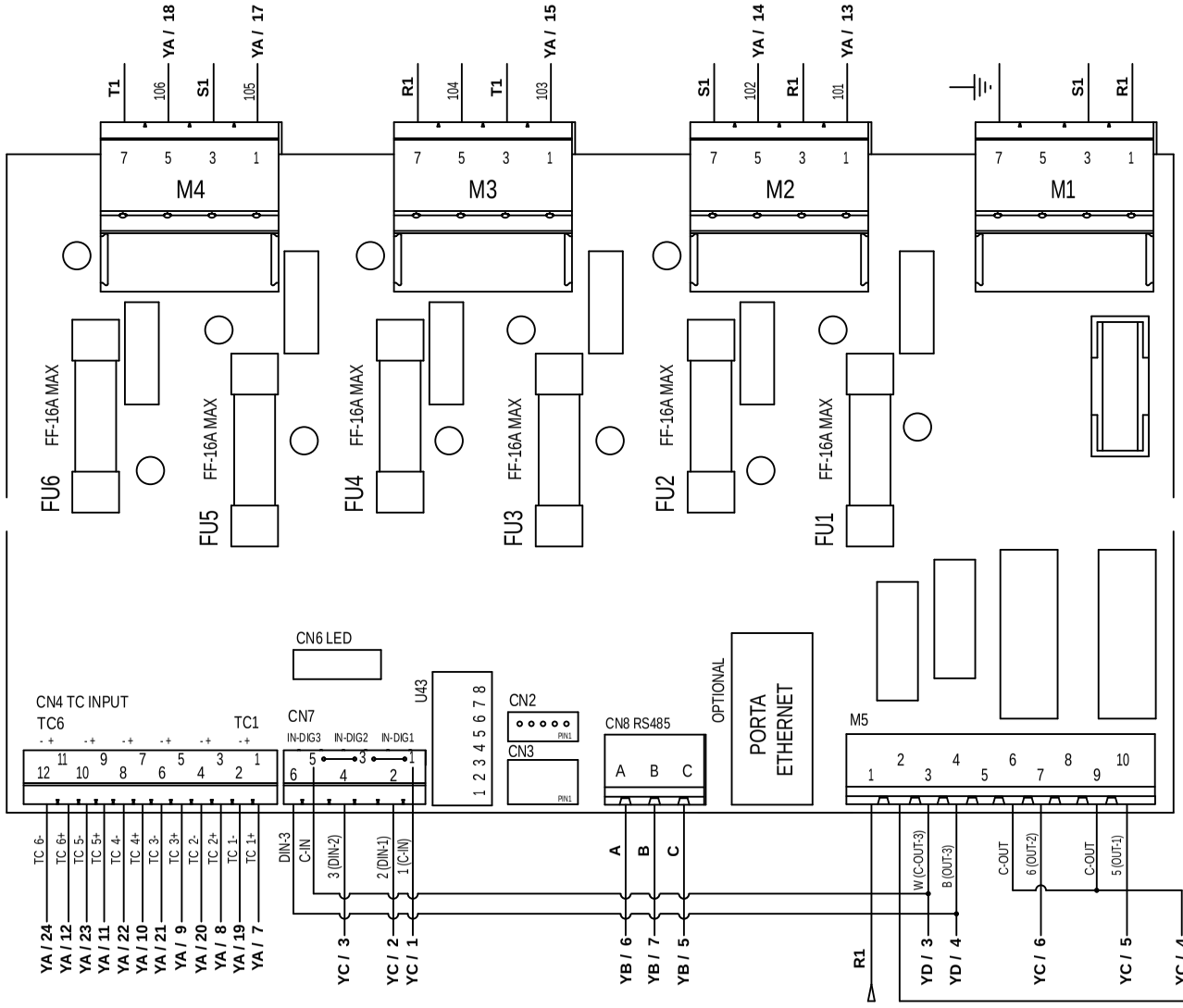
12 Electrical schemes

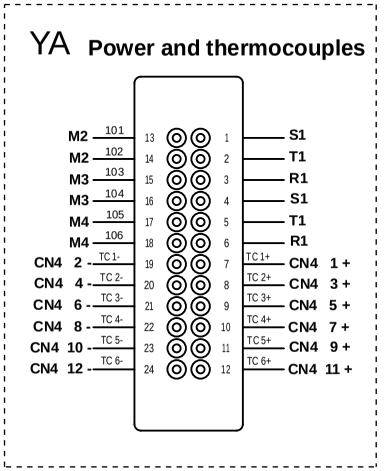
GRAPHIC DISPLAY TH-M6 6-12 ZONES



Electric scheme for THM6 6Z 240 1C24



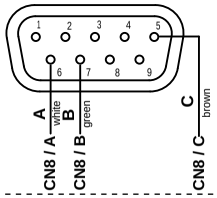




OPTIONAL

YB RS485

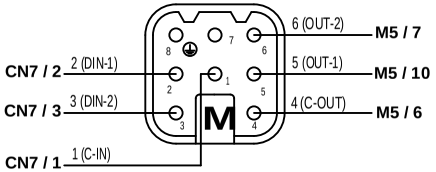
Serial communication interface (MODBUS RTU protocol)



OPTIONAL

YC DIG

Connector for compliances and emergencies handling



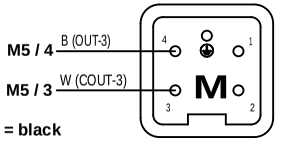
DIG. INPUT 1 → SP2
DIG. INPUT 2 → OFF
DIG. INPUT 3 → WAIT

DIG. OUTPUT 1 (NO) → TEMP. OK
DIG. OUTPUT 2 (NO) → ALARM
DIG. OUTPUT 3 (NO) → WAIT

OPTIONAL

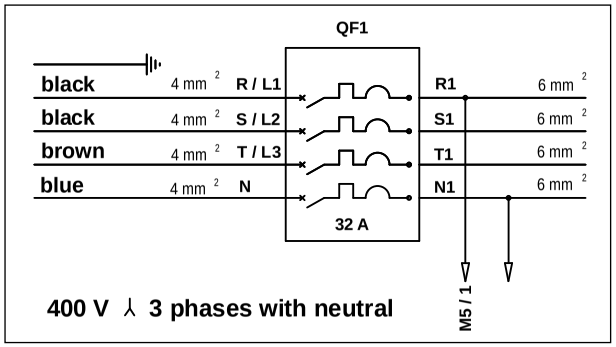
YD SYNC

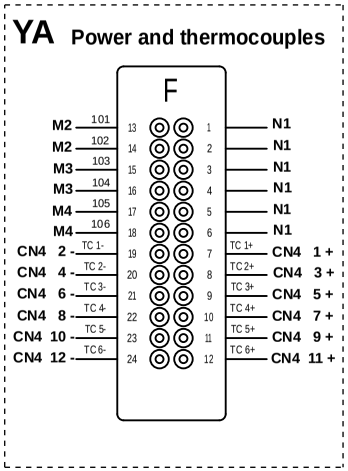
Arrangement for connection to another controller

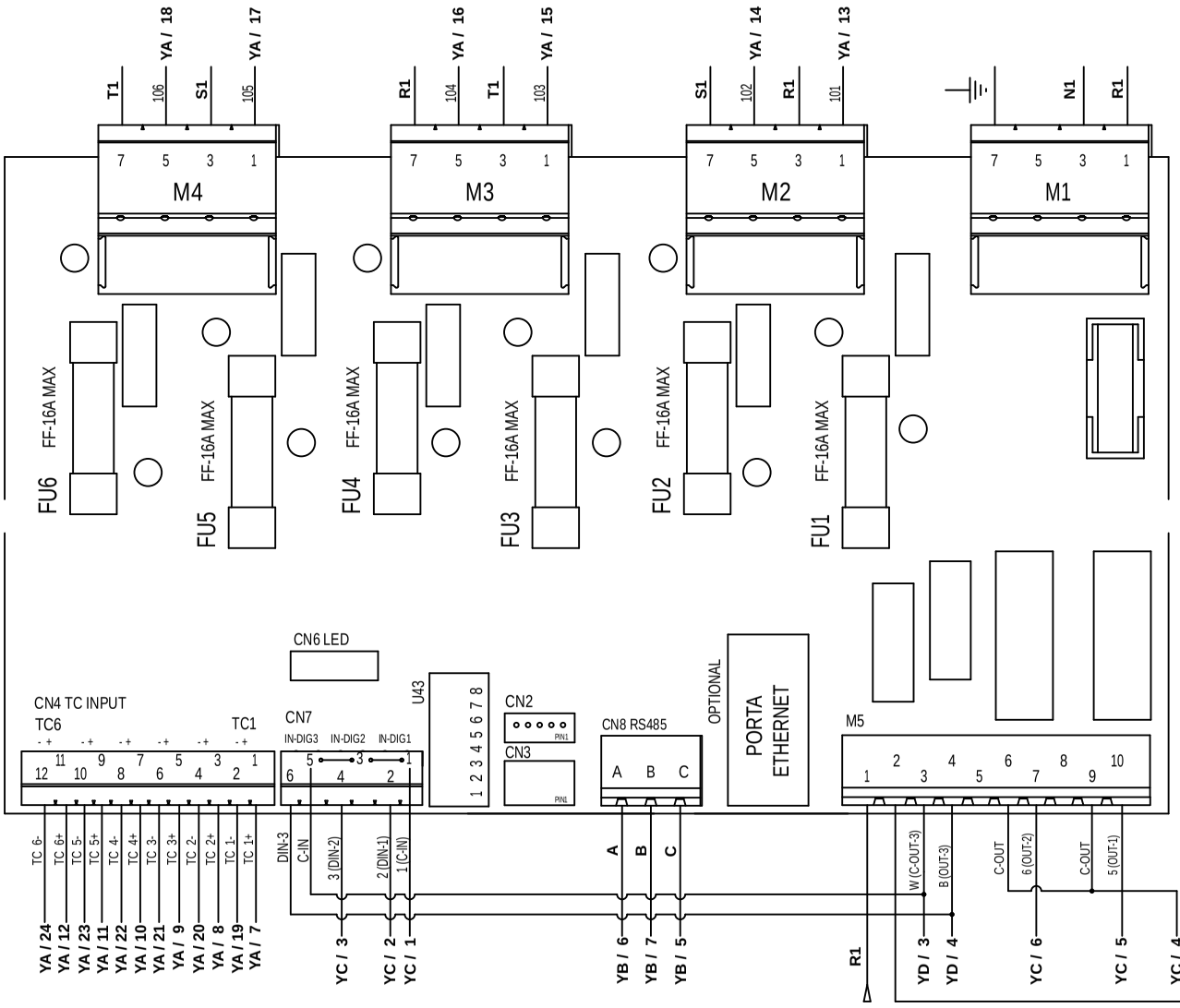


B = black
W = white

Electric scheme for THM6 6Z 400 1C24



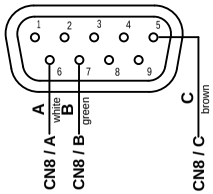

YA Power and thermocouples
F
M2 101
M2 102
M3 103
M3 104
M4 105
M4 106
N1
CN4 2 - TC 1- CN4 1 +
CN4 4 - TC 2- CN4 3 +
CN4 6 - TC 3- CN4 5 +
CN4 8 - TC 4- CN4 7 +
CN4 10 - TC 5- CN4 9 +
CN4 12 - TC 6- CN4 11 +



OPTIONAL

YB RS485

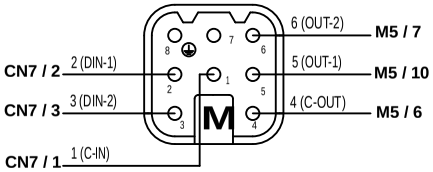
Serial communication interface (MODBUS RTU protocol)



OPTIONAL

YC DIG

Connector for compliances and emergencies handling



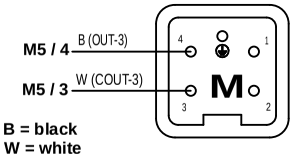
DIG. INPUT 1 → SP2
DIG. INPUT 2 → OFF
DIG. INPUT 3 → WAIT

DIG. OUTPUT 1 (NO) → TEMP. OK
DIG. OUTPUT 2 (NO) → ALARM
DIG. OUTPUT 3 (NO) → WAIT

OPTIONAL

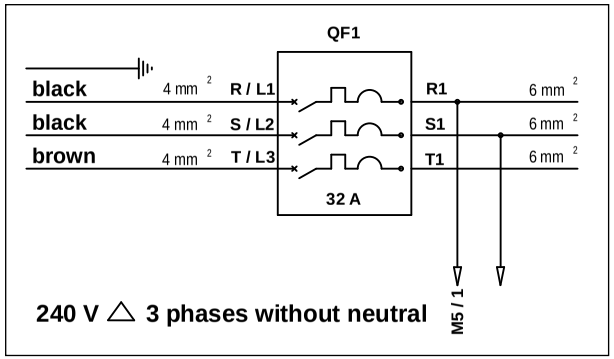
YD SYNC

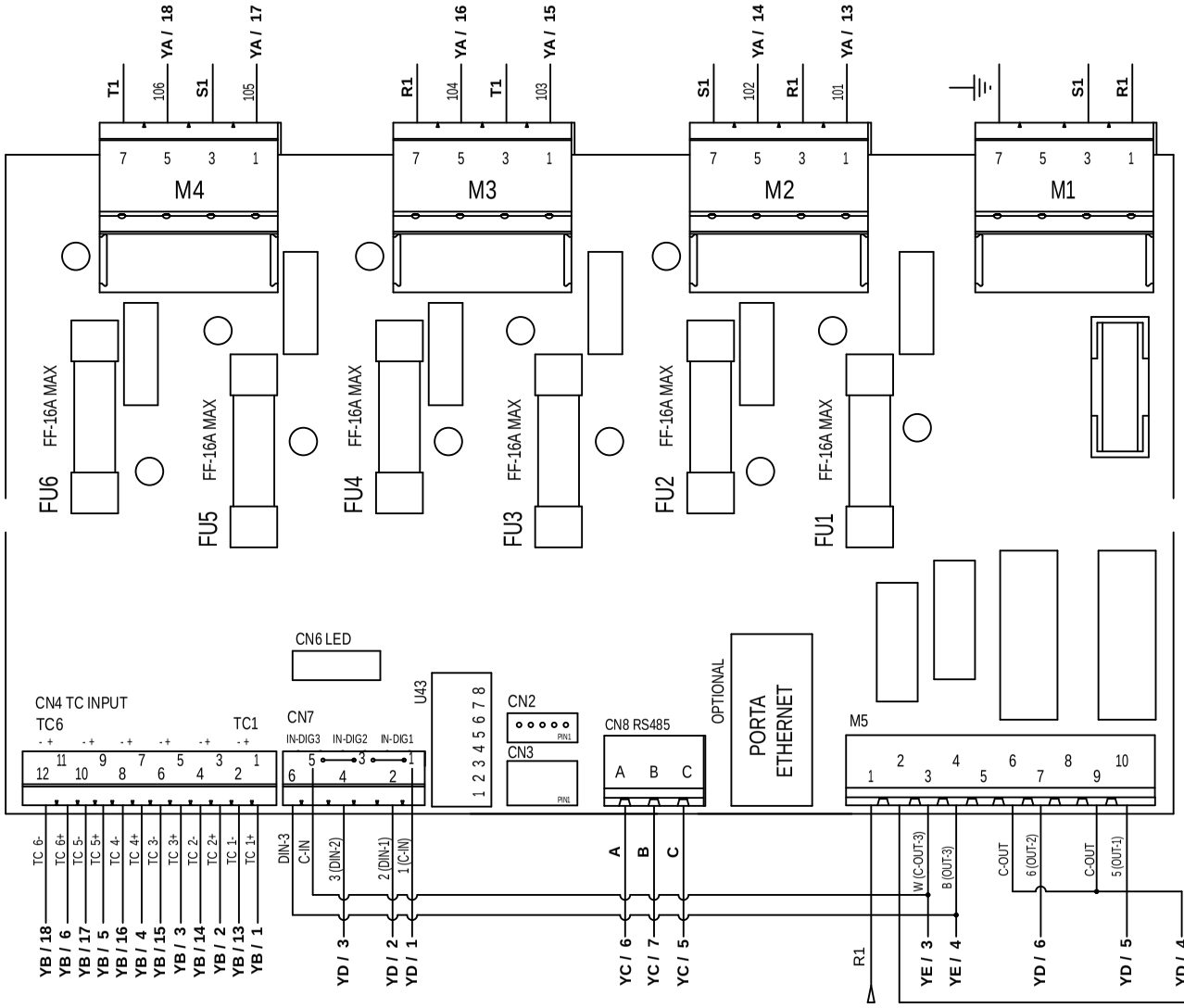
Arrangement for connection to another controller



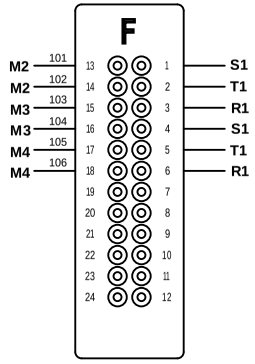
B = black
W = white

Electric scheme for THM6 6Z 240 2C24

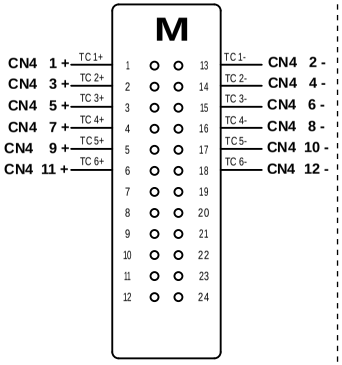




YA Power



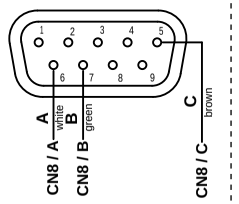
YB Thermocouples



OPTIONAL

YC RS485

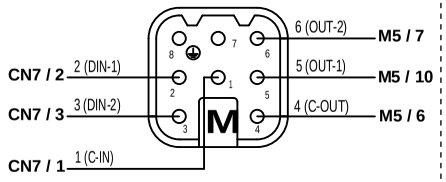
Serial communication interface (MODBUS RTU protocol)



OPTIONAL

YD DIG

Connector for compliances and emergencies handling



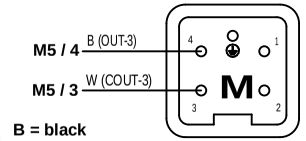
DIG. INPUT 1 → SP2
DIG. INPUT 2 → OFF
DIG. INPUT 3 → WAIT

DIG. OUTPUT 1 (NO) → TEMP. OK
DIG. OUTPUT 2 (NO) → ALARM
DIG. OUTPUT 3 (NO) → WAIT

OPTIONAL

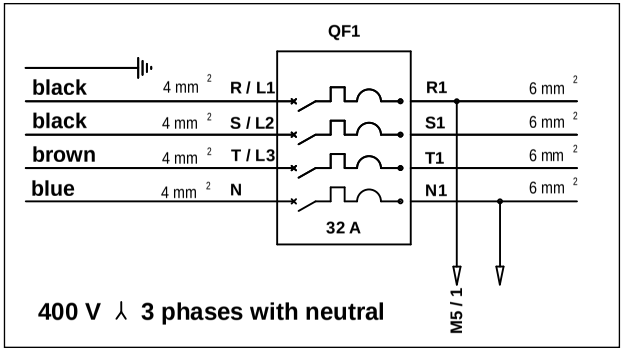
YE SYNC

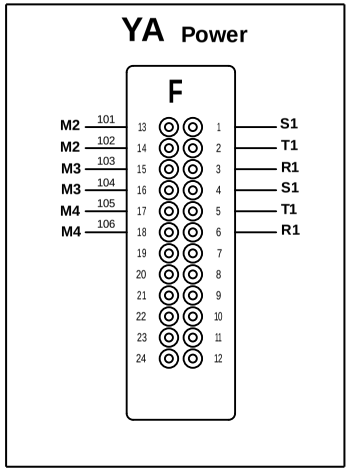
Arrangement for connection to another controller

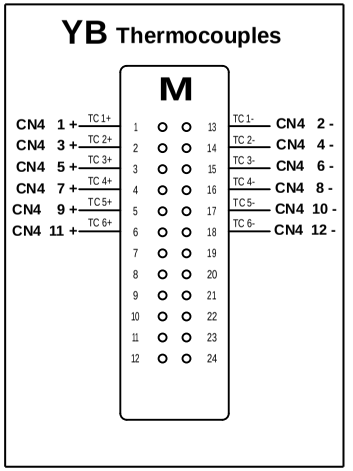


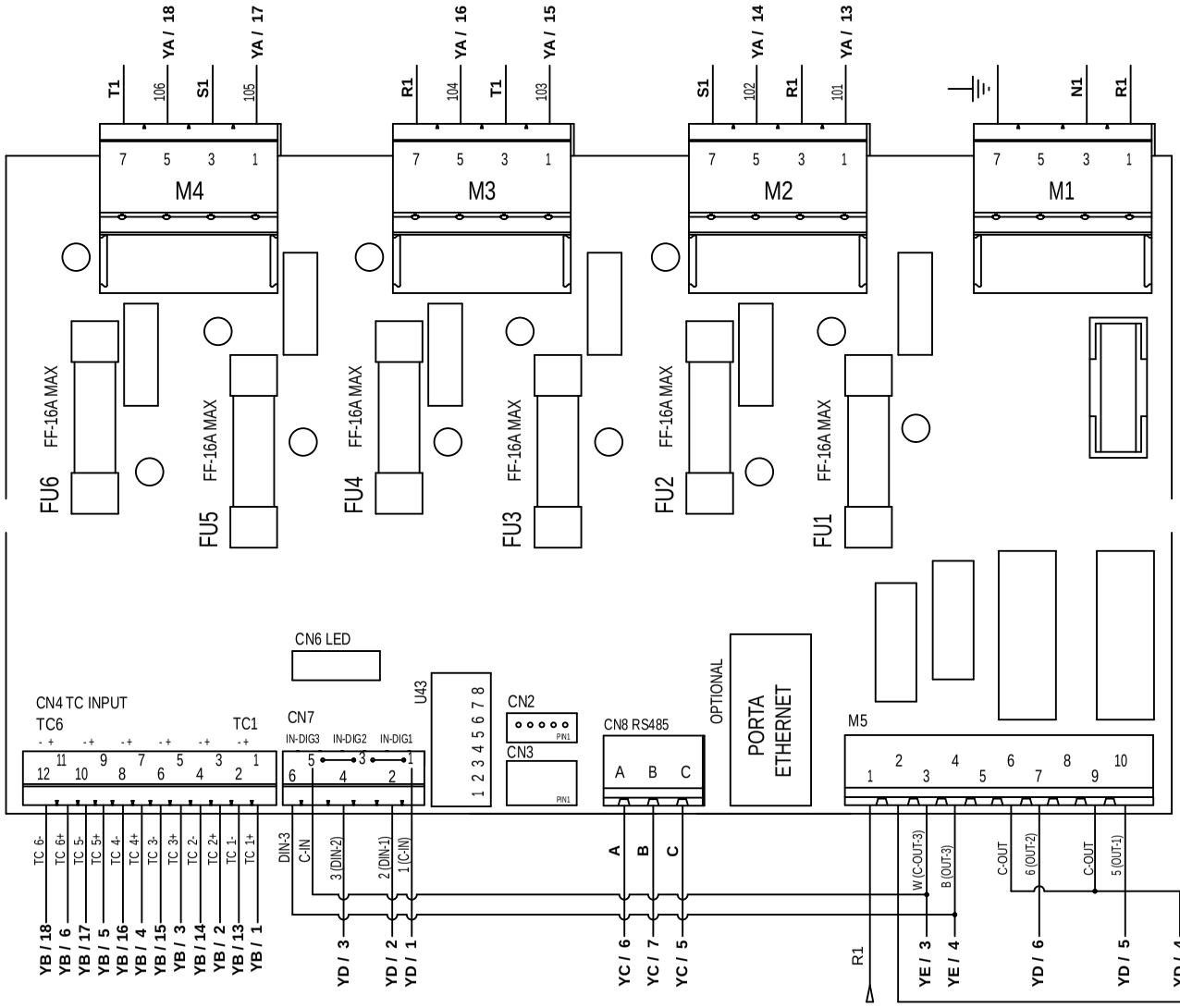
B = black
W = white

Electric scheme for THM6 6Z 400 2C24





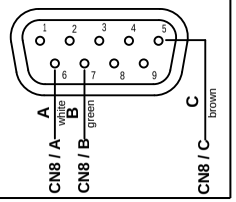



T1 106 S1 105 YA / 18 YA / 17
R1 104 T1 103 YA / 16 YA / 15
S1 102 R1 101 YA / 14 YA / 13
N1 R1
M4
M3
M2
M1
FU6 FF-16A MAX
FU5 FF-16A MAX
FU4 FF-16A MAX
FU3 FF-16A MAX
FU2 FF-16A MAX
FU1 FF-16A MAX
CN6 LED
CN4 TC INPUT
TC6
TC1
CN7
IN-DIG3 IN-DIG2 IN-DIG1
U43
CN2
CN3
CN8 RS485
A B C
OPTIONAL
PORTA ETHERNET
M5
TC 6- TC 6+ TC 5- TC 5+ TC 4- TC 4+ TC 3- TC 3+ TC 2- TC 2+ TC 1- TC 1+
DIN-3 C-IN 3 (DIN-2) 2 (DIN-1) 1 (C-IN)
A B C
W (C-OUT-3) B (OUT-3) C-OUT 6 (OUT-2) C-OUT 5 (OUT-1) 4 (C-OUT)
YB / 18 YB / 6 YB / 17 YB / 5 YB / 16 YB / 4 YB / 15 YB / 3 YB / 14 YB / 2 YB / 13 YB / 1
YD / 3 YD / 2 YD / 1
YC / 6 YC / 7 YC / 5
R1
YE / 3 YE / 4 YD / 6 YD / 5 YD / 4
N1
M FAN

OPTIONAL

YC RS485

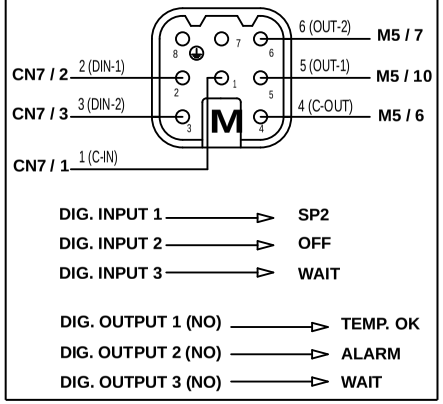
Serial communication interface (MODBUS RTU protocol)



OPTIONAL

YD DIG

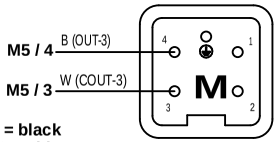
Connector for compliances and emergencies handling


6 (OUT-2) M5 / 7
CN7 / 2 2 (DIN-1) 5 (OUT-1) M5 / 10
CN7 / 3 3 (DIN-2) 4 (C-OUT) M5 / 6
CN7 / 1 1 (C-IN)
M
DIG. INPUT 1 SP2
DIG. INPUT 2 OFF
DIG. INPUT 3 WAIT
DIG. OUTPUT 1 (NO) TEMP. OK
DIG. OUTPUT 2 (NO) ALARM
DIG. OUTPUT 3 (NO) WAIT

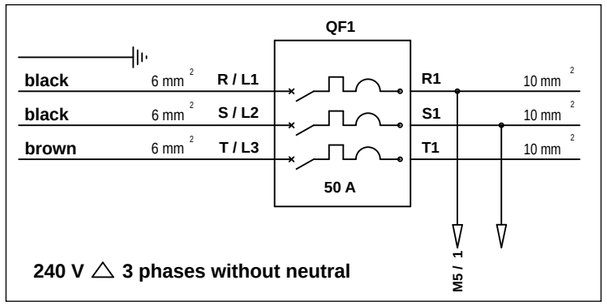
OPTIONAL

YE SYNC

Arrangement for connection to another controller



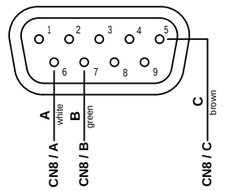
Electric scheme for THM6 12Z 240 2C24



OPTIONAL

YC RS485

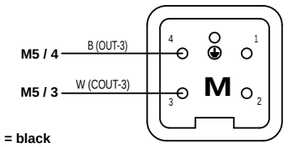
Serial communication interface (MODBUS RTU protocol)



OPTIONAL

YE SYNC

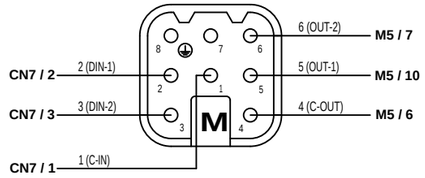
Arrangement for connection to another controller



OPTIONAL

YD DIG

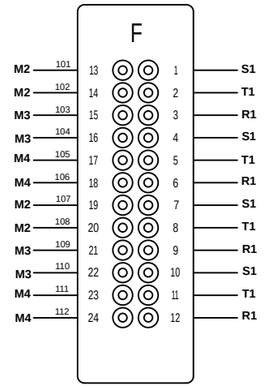
Connector for compliances and emergencies handling



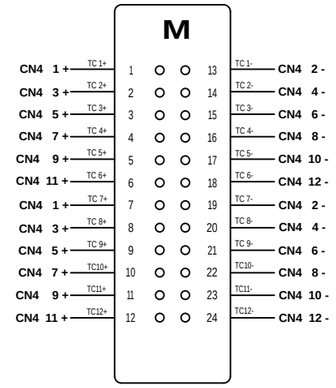
DIG. INPUT 1 → SP2
DIG. INPUT 2 → OFF
DIG. INPUT 3 → WAIT

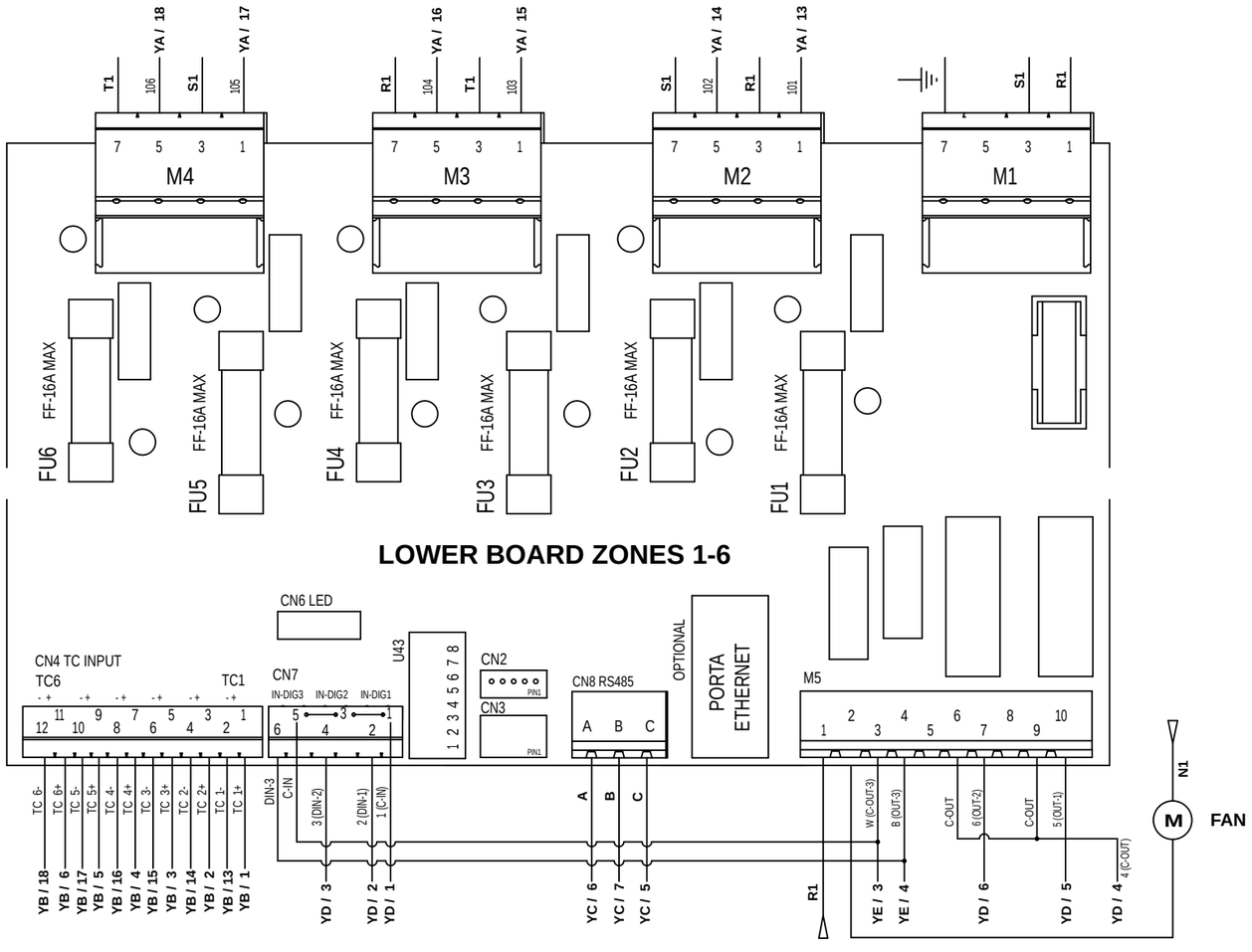
DIG. OUTPUT 1 (NO) → TEMP. OK
DIG. OUTPUT 2 (NO) → ALARM
DIG. OUTPUT 3 (NO) → WAIT

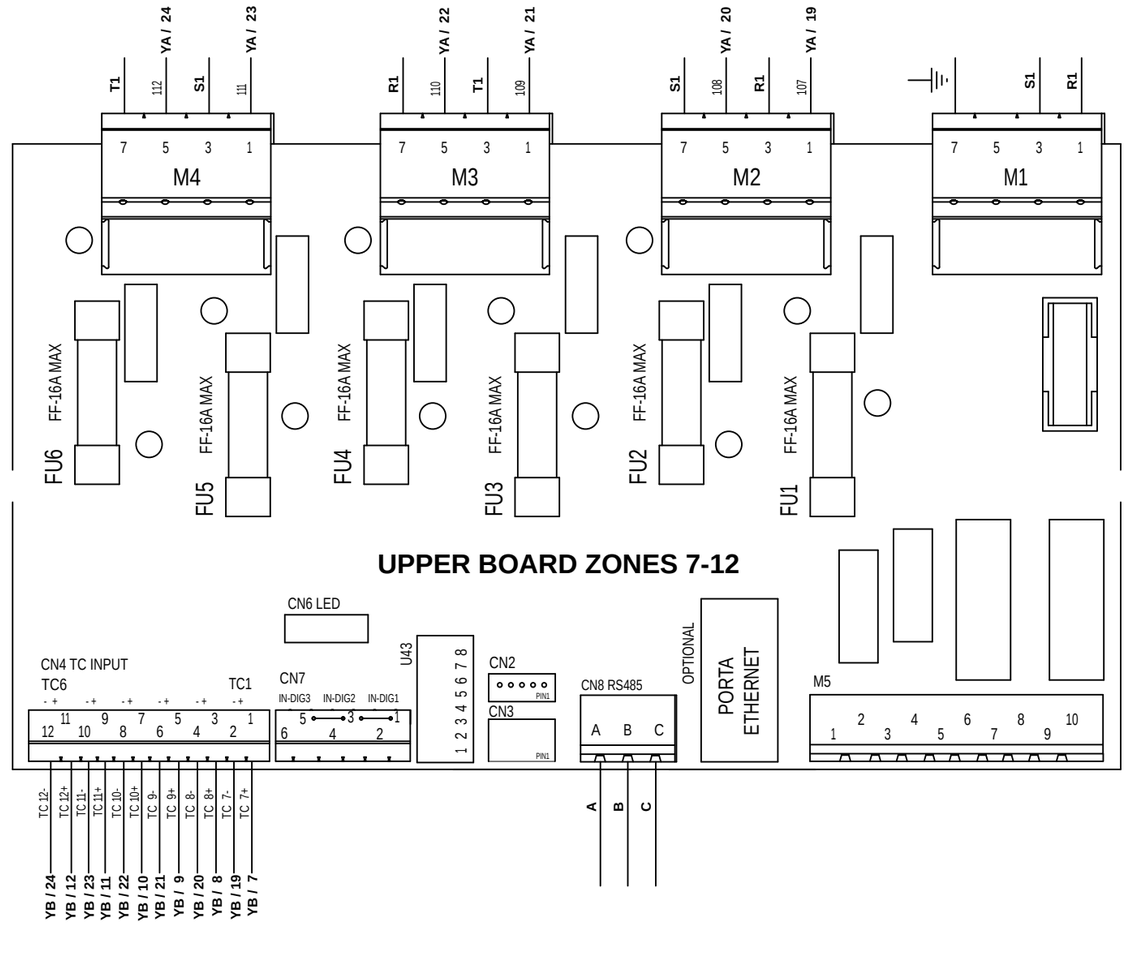
YA Power

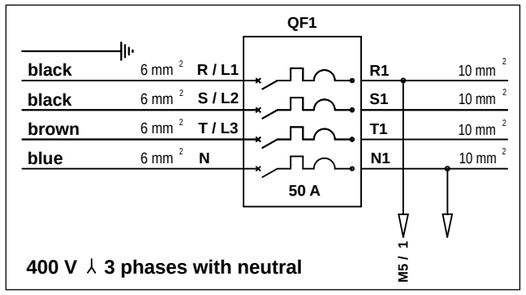


YB Thermocouples




YB / 18 TC 6- YB / 6 TC 6+ YB / 17 TC 5- YB / 5 TC 5+ YB / 16 TC 4- YB / 4 TC 4+ YB / 15 TC 3- YB / 3 TC 3+ YB / 14 TC 2- YB / 2 TC 2+ YB / 13 TC 1- YB / 1 TC 1+
YD / 3 DIN-3 YD / 2 C-IN YD / 1 3 (DIN-2) 2 (DIN-1) 1 (C-IN)
YC / 6 A YC / 7 B YC / 5 C
R1 YE / 3 W (C-OUT-3) YE / 4 B (OUT-3)
YD / 6 C-OUT 6 (OUT-2) YD / 5 C-OUT 5 (OUT-1) YD / 4 4 (C-OUT)
N1 M FAN
T1 106 S1 105 M4 R1 104 T1 103 M3 S1 102 R1 101 M2 S1 R1 M1
FU6 FF-16A MAX FU5 FF-16A MAX FU4 FF-16A MAX FU3 FF-16A MAX FU2 FF-16A MAX FU1 FF-16A MAX
LOWER BOARD ZONES 1-6
CN6 LED
CN4 TC INPUT TC6 TC1
CN7 IN-DIG3 IN-DIG2 IN-DIG1
U43
CN2 PIN1
CN3 PIN1
CN8 RS485 A B C
OPTIONAL PORTA ETHERNET
M5

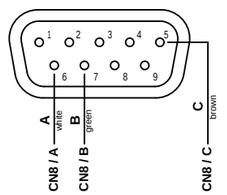

YB / 24 TC 12- YB / 12 TC 12+ YB / 23 TC 11- YB / 11 TC 11+ YB / 22 TC 10- YB / 10 TC 10+ YB / 21 TC 9- YB / 9 TC 9+ YB / 20 TC 8- YB / 8 TC 8+ YB / 19 TC 7- YB / 7 TC 7+
A B C
T1 112 S1 111 M4 R1 110 T1 109 M3 S1 108 R1 107 M2 S1 R1 M1
FU6 FF-16A MAX FU5 FF-16A MAX FU4 FF-16A MAX FU3 FF-16A MAX FU2 FF-16A MAX FU1 FF-16A MAX
UPPER BOARD ZONES 7-12
CN6 LED
CN4 TC INPUT TC6 TC1
CN7 IN-DIG3 IN-DIG2 IN-DIG1
U43
CN2 PIN1
CN3 PIN1
CN8 RS485 A B C
OPTIONAL PORTA ETHERNET
M5



OPTIONAL

YC RS485

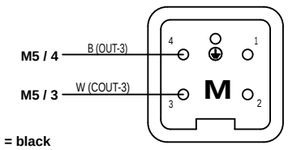
Serial communication interface (MODBUS RTU protocol)



OPTIONAL

YE SYNC

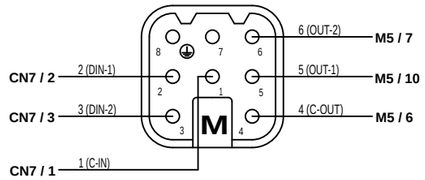
Arrangement for connection to another controller



OPTIONAL

YD DIG

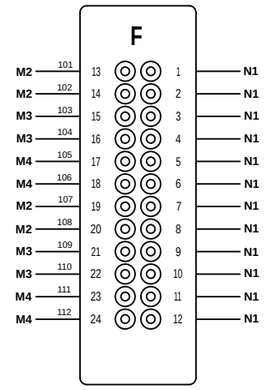
Connector for compliances and emergencies handling



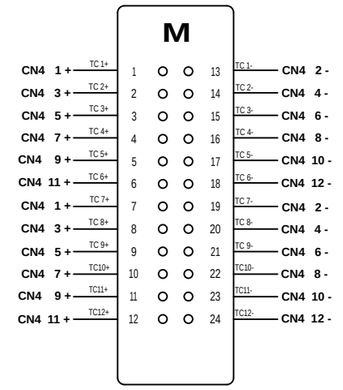
DIG. INPUT 1 → SP2
DIG. INPUT 2 → OFF
DIG. INPUT 3 → WAIT

DIG. OUTPUT 1 (NO) → TEMP. OK
DIG. OUTPUT 2 (NO) → ALARM
DIG. OUTPUT 3 (NO) → WAIT

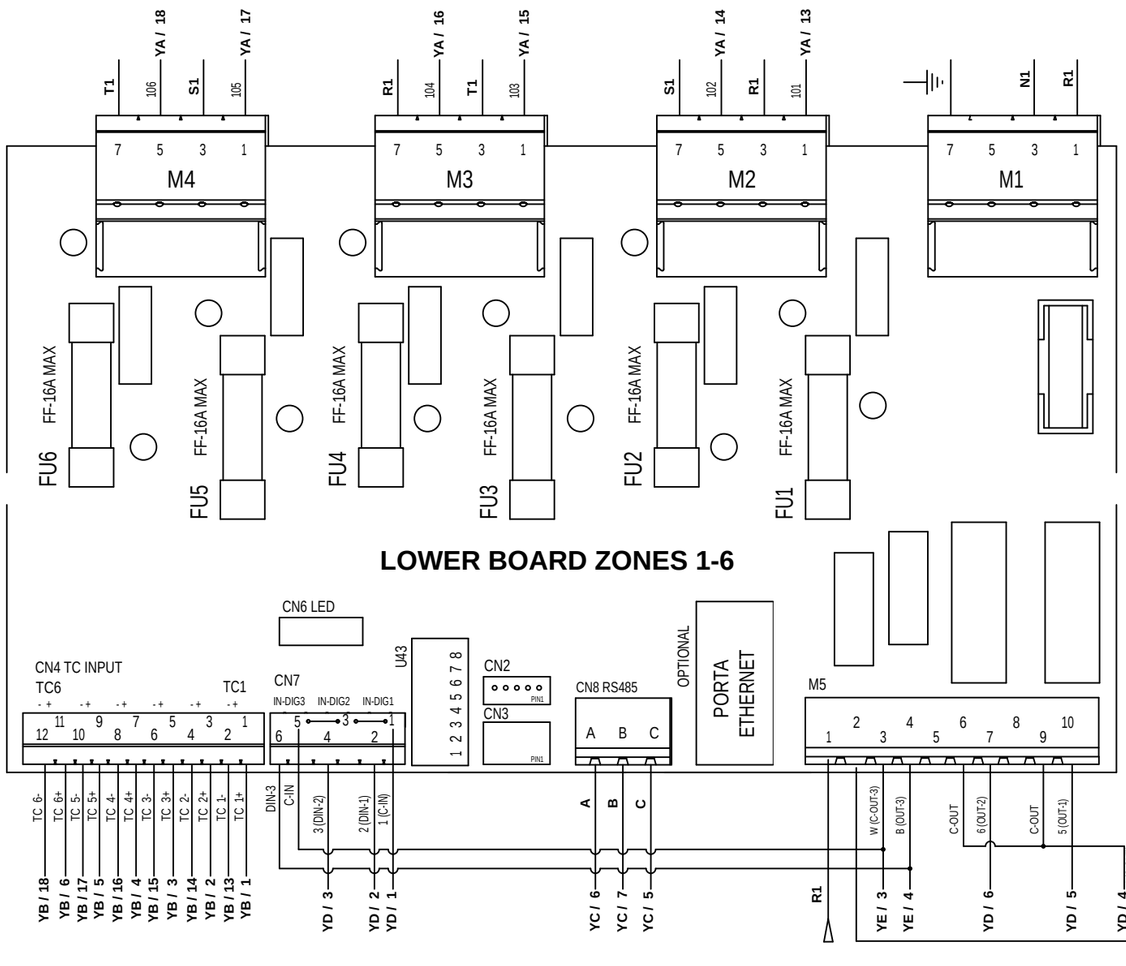
YA Power

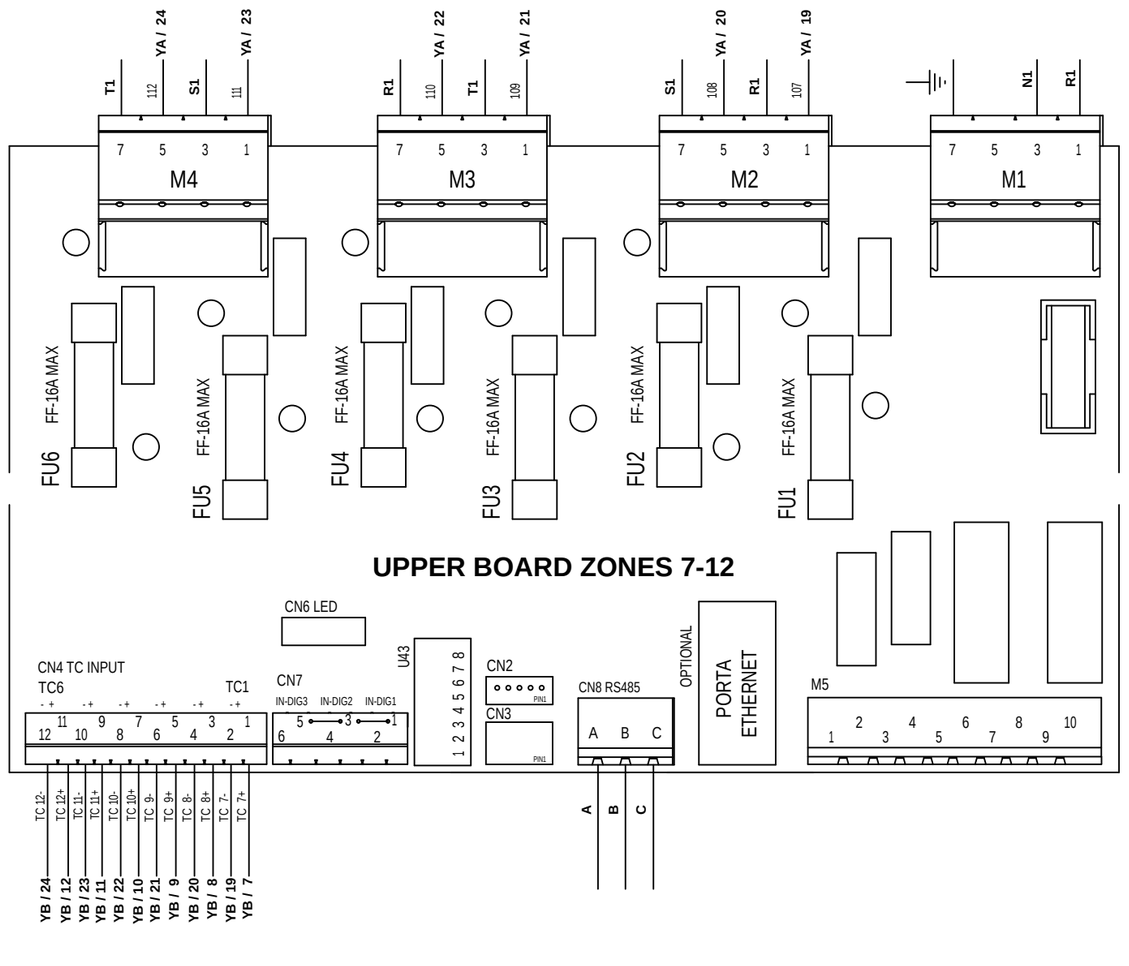


YB Thermocouples

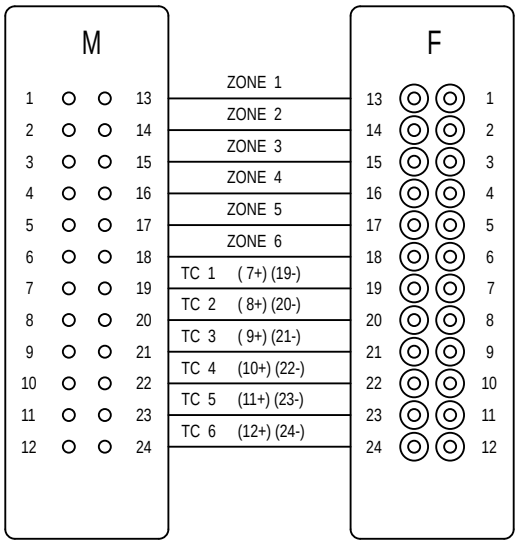


Electric scheme for THM6 12Z 400 2C24


M4
M3
M2
M1
T1 106 S1 105
R1 104 T1 103
S1 102 R1 101
N1 R1
FF-16A MAX
FU6
FU5
FU4
FU3
FU2
FU1
LOWER BOARD ZONES 1-6
CN6 LED
CN4 TC INPUT
TC6 TC1
CN7
IN-DIG3 IN-DIG2 IN-DIG1
U43
CN2
CN3
CN8 RS485
OPTIONAL
PORTA ETHERNET
M5
TC 6- TC 6+ TC 5- TC 5+ TC 4- TC 4+ TC 3- TC 3+ TC 2- TC 2+ TC 1- TC 1+
DIN-3 C-IN 3 (DIN-2) 2 (DIN-1) 1 (C-IN)
A B C
W (C-OUT-3) B (OUT-3)
C-OUT 6 (OUT-2) C-OUT 5 (OUT-1) 4 (C-OUT)
YB / 18 YB / 6 YB / 17 YB / 5 YB / 16 YB / 4 YB / 15 YB / 3 YB / 14 YB / 2 YB / 13 YB / 1
YD / 3 YD / 2 YD / 1
YC / 6 YC / 7 YC / 5
R1
YE / 3 YE / 4
YD / 6 YD / 5 YD / 4
N1
M
FAN

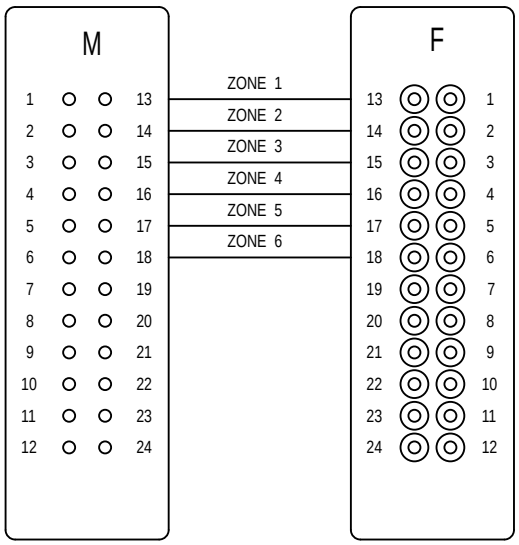


Connecting cable for 6Z4001C24 or 6Z2401C24. 1 cable 24 poles power and thermocouples (for connection box E05131)

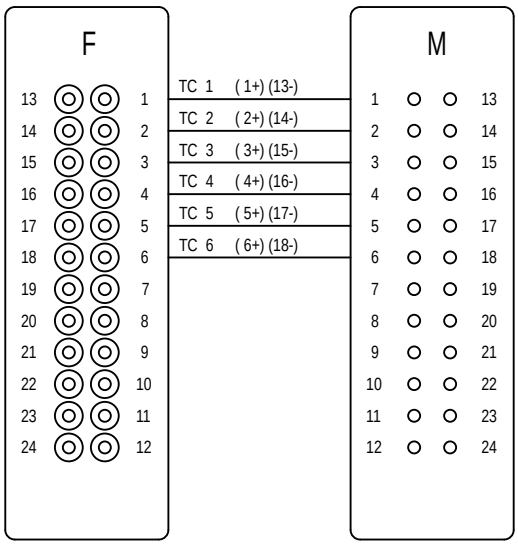


L=3.5 m

Connecting cables for 6Z4002C24 or 6Z2402C24. 1 cable 24 poles power + 1 cable 24 poles thermocouples (for connection box E05137)

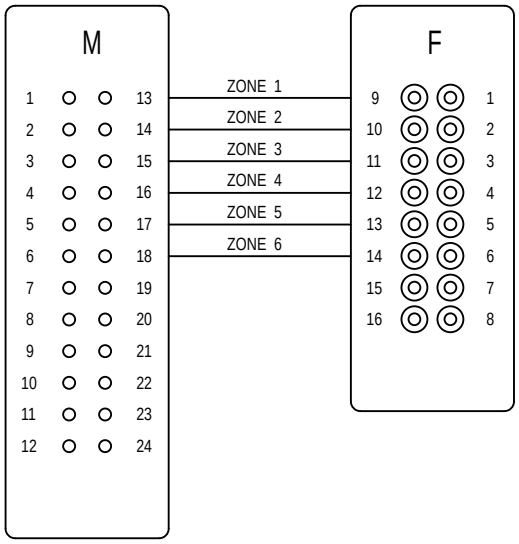


L=3.5 m

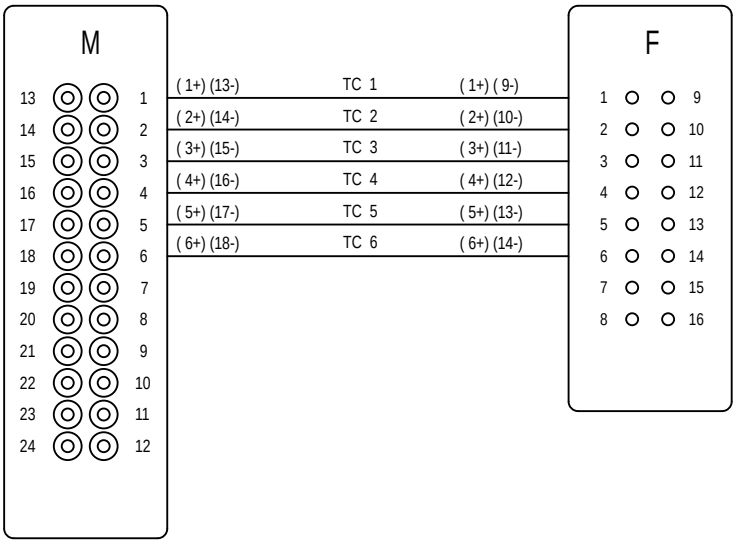


L=3.5 m

Connecting cables for 6Z4002C16 or 6Z2402C16. 1 cable 16 poles power + 1 cable 16 poles thermocouples (for connection box E08102)

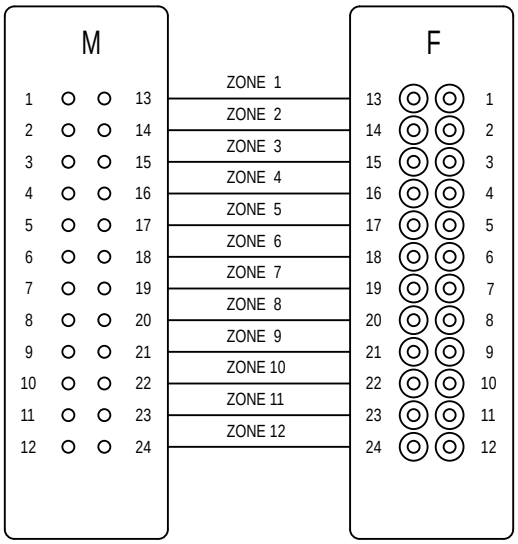


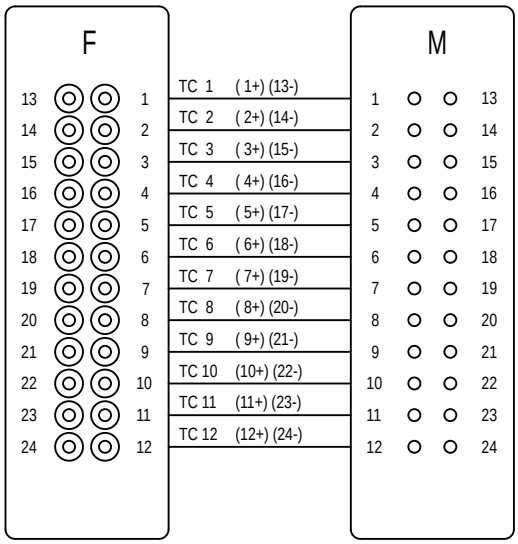
L=3.5 m



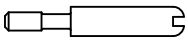
L=3.5 m

Connecting cables for 12Z4002C24 or 12Z2402C24. 1 cable 24 poles power + 1 cable 24 poles thermocouples (for connection box E05137)

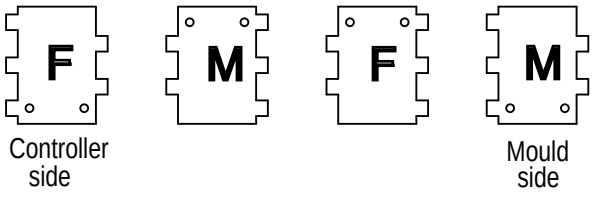


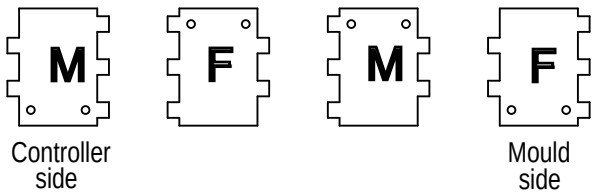


SYSTEM OF CODIFICATION WITH MALE PIN

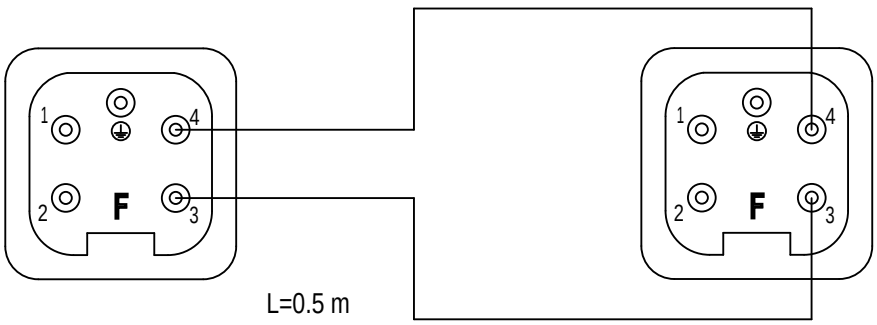


To avoid connection mistakes during the wiring of the controller TH-M6 12 zones, we'll use male codification pin.
In this way we can ensure a correct connection of the cables. See codification scheme.

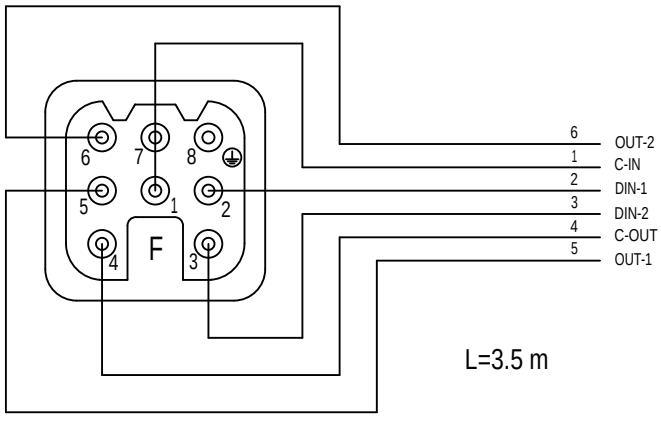




OPTIONAL SYNCHRONOUS HEATING



OPTIONAL FOR DIGITAL IN/OUT



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